

Mirror Equation

$$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$$

$$f = \frac{d_i d_o}{d_i + d_o}$$

f is the focal length (negative for convex mirror)

d_o is the object distance (how far the actual object is from the mirror)

$$d_i = \frac{d_o f}{d_o - f}$$

d_i is the image distance (how far the image of the object is from the mirror). Negative if the image is behind the mirror.

$$d_o = \frac{d_i f}{d_i - f}$$

Magnification Equation

$$m = \frac{h_i}{h_o} = \frac{-d_i}{d_o}$$

m is the magnification

d_o is the object distance

$$h_i = \frac{-d_i h_o}{d_o}$$

$$h_o = \frac{-h_i d_o}{d_i}$$

d_i is the image distance (negative if the image is behind the mirror)

h_o is the object height

$$d_i = \frac{-h_i d_o}{h_o}$$

$$d_o = \frac{-d_i h_o}{h_i}$$

h_i is the image height (negative if the image is inverted)

- A 4-cm tall salt shaker is placed 10 cm in front of a concave mirror with $f = 4$ cm.
 - How far is the image from the mirror?
 - How tall is the image?
- A person casts a 15-cm tall image (behind the mirror) in a convex mirror with $f = -140$ cm when she stands 2 m from the mirror. How tall is she?
- A 10-cm tall doll is placed 2 cm in front of a concave mirror with $f = 4$ cm.
 - How far is the image from the mirror?
 - How tall is the image?
- A microscope produces an image that is 5.50×10^{-4} m high from an object that is 2.00×10^{-6} m high. What is the magnification of this microscope?
- An electron microscope magnifies a virus that is 3.50×10^{-7} m. If the magnification is 3.70×10^5 , how big will the image be?
- A virtual image is produced by a convex mirror that is 1.60 cm from the mirror. If the magnification is 0.20, how far from the mirror is the object?